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COSMIC RAY INTENSITY AT HIGH ALTITUDES on February 23, 1956*

By

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A balloon flight of a single Geiger tube was made[1] from Iowa City (λ = 52°N) during the period

1. The authors are indebted to Dr. J. A. Simpson for informing us of the fact that a great cosmic ray storm was in progress. The onset of the storm occurred at 03^h49^m G.M.T. February 23.

19^h33^m to 21^h12^m Greenwich Mean Time on February 23, 1956. The apparatus consisted of a single Victoreen 1B85 Geiger tube of calibrated effective length and a radio transmitter, all housed in a pressure-tight aluminum shell of wall thickness 0.032". Identical apparatus has been flown by this laboratory on previous occasions by means of balloons and rockets. The axis of the tube was nearly vertical. The geomagnetic latitude of equipment while at the highest altitude was estimated to be 53°N.

The raw counting rate of the Geiger tube during the ascent of the balloon is shown as a function of time in Figure 1. The measured effective length of the tube was 6.8 $\pm$ 0.2 cm. and the diameter was 1.90 $\pm$ 0.02 cm. The maximum observed value of the counting rate was 53.0 $\pm$ 0.3 counts/second during the period 20^h55^m to 21^h08^m G.M.T.

Correcting for dead time and intrinsic efficiency ($\epsilon = 0.98$) and dividing by the appropriate geometric factor of the counter[2] we find

2. E. C. Ray, M. S. Thesis, State University of Iowa (June 1953).

(1) $\bar{J} = 0.76 \pm 0.03$ (cm^2 sec stered)$^{-1}$

for the angular average value, over the upper hemisphere, of the unidirectional intensity of all charged particles, the average being taken in the usual manner.[3] An equivalent

3. L. H. Meredith, J. A. Van Allen, and M. B. Gottlieb, Phys. Rev. 99, 198 (1955).

statement of the result is

(2) $J_o = 4.8 \pm 0.2$ (cm^2 sec)$^{-1}$

where J_o is the flux through a sphere of unit cross-section.

During the period 1950-1955, this laboratory has made a large number of balloon and rocket flights of single Geiger tubes and Geiger tube telescopes at geomagnetic latitudes ranging from 41°N to 89°N. A summary of pertinent

on an atmospheric pressure basis assuming various constant rates of ascent in m/sec, an assumption concerning balloon performance which is well grounded in our experience with flights of clusters of rubber balloons of the type used. The results of this process are shown in Figure 2.

From this plot it appears likely that the actual rate of rise was about 4 m/sec and that the previously quoted intensities (1) and (2) likely refer to the vicinity of the Pfotzer-Regener maximum.

We are indebted particularly to Drs. F. B. McDonald and K. A. Anderson and to Messrs. G. Ludwig and W. R. Webber for assistance.

Figure Captions

Figure 1 — Observed counting rate of single Geiger tube as a function of time during the ascent of the balloon. Statistical standard errors are shown.

Figure 2 — Replots of observed counting rate data of Figure 1 (assuming various constant rates of rise of balloon) showing comparison with normal situation at $\lambda = 53°$ (solid curve).

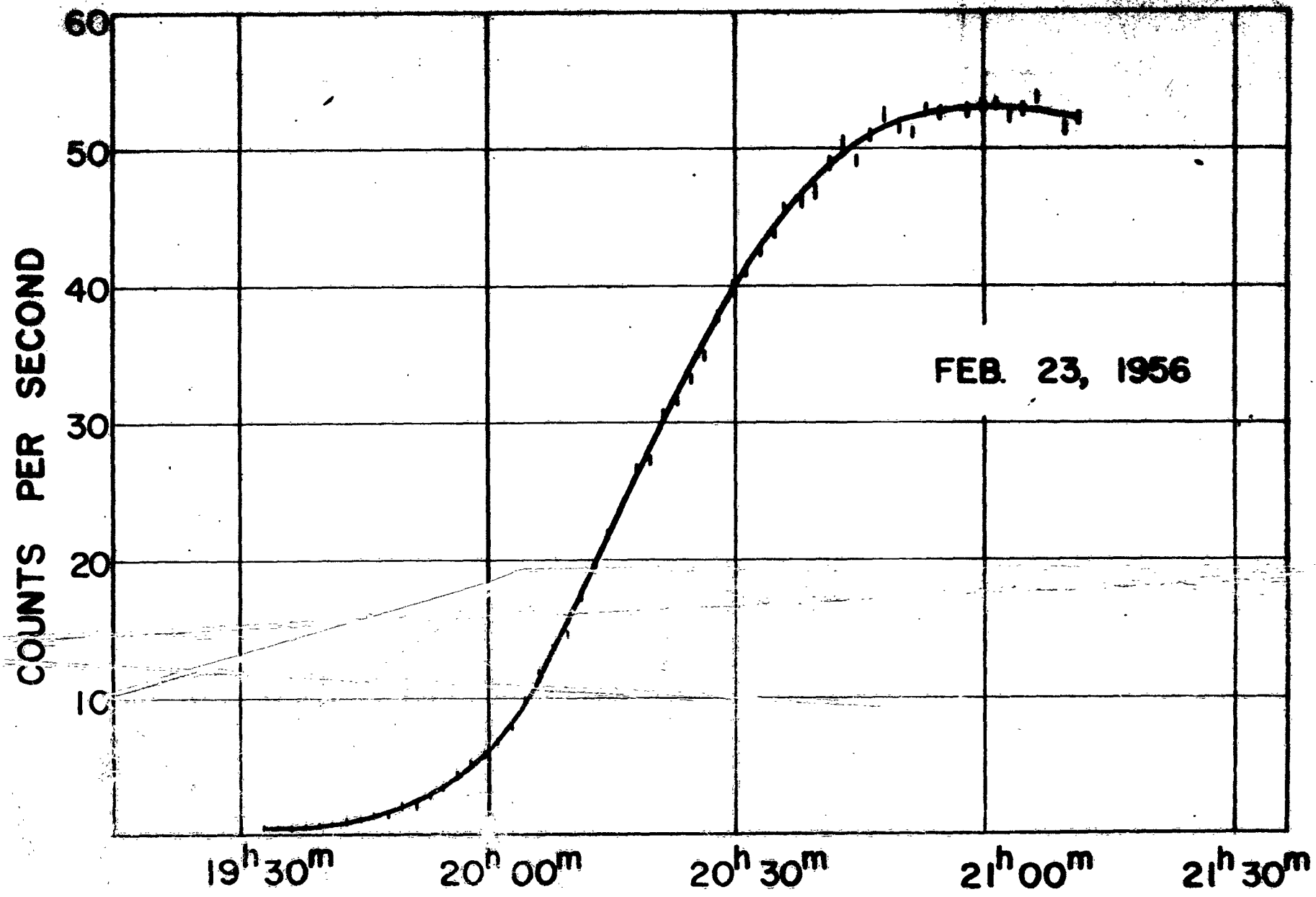
60
50
40
30
20
10
COUNTS PER SECOND
FEB. 23, 1956
19h30m
20h00m
20h30m
21h00m
21h30m
GREENWICH MEAN TIME

FIG. 1

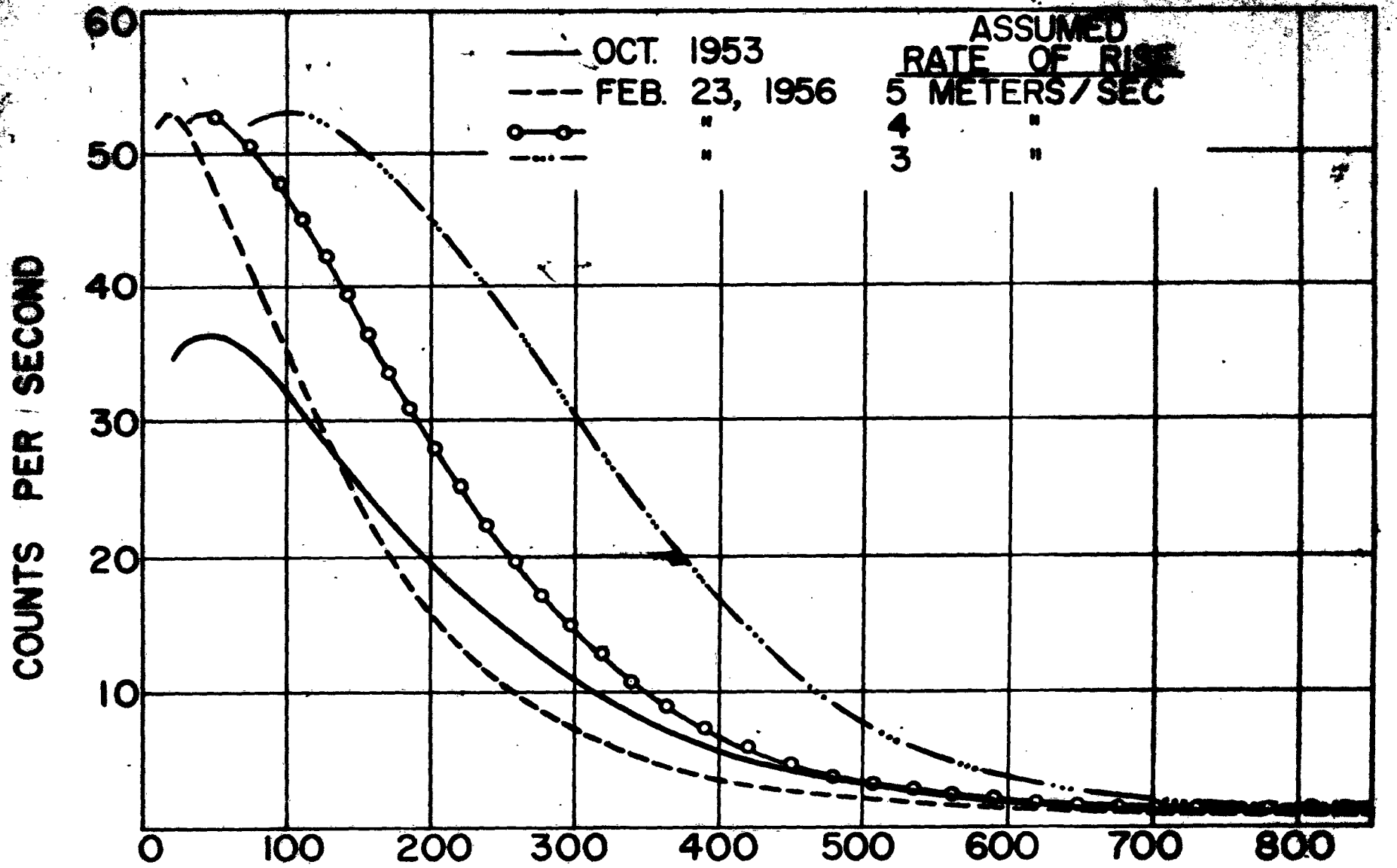
OCT. 1953
FEB. 23, 1956
ASSUMED RATE OF RISE
5 METERS/SEC
4 "
3 "
COUNTS PER SECOND
60
50
40
30
20
10
0
100
200
300
400
500
600
700
800
ALTITUDE IN G/CM2

FIG. 2